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Bear Creek Riparian Restoration Planting Plan

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(Updated October 2022)



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Goals

The goal of the Upper Bear Creek Riparian Restoration and Water Quality Improvement Project is to restore and protect ten acres of vegetated riparian buffer along upper Bear Creek. The intended results of the project include reduced stream-bank erosion, reduced nutrient and bacteria contamination from livestock wastes entering the stream water, and increased quality and quantity of habitat for native fish and wildlife species.

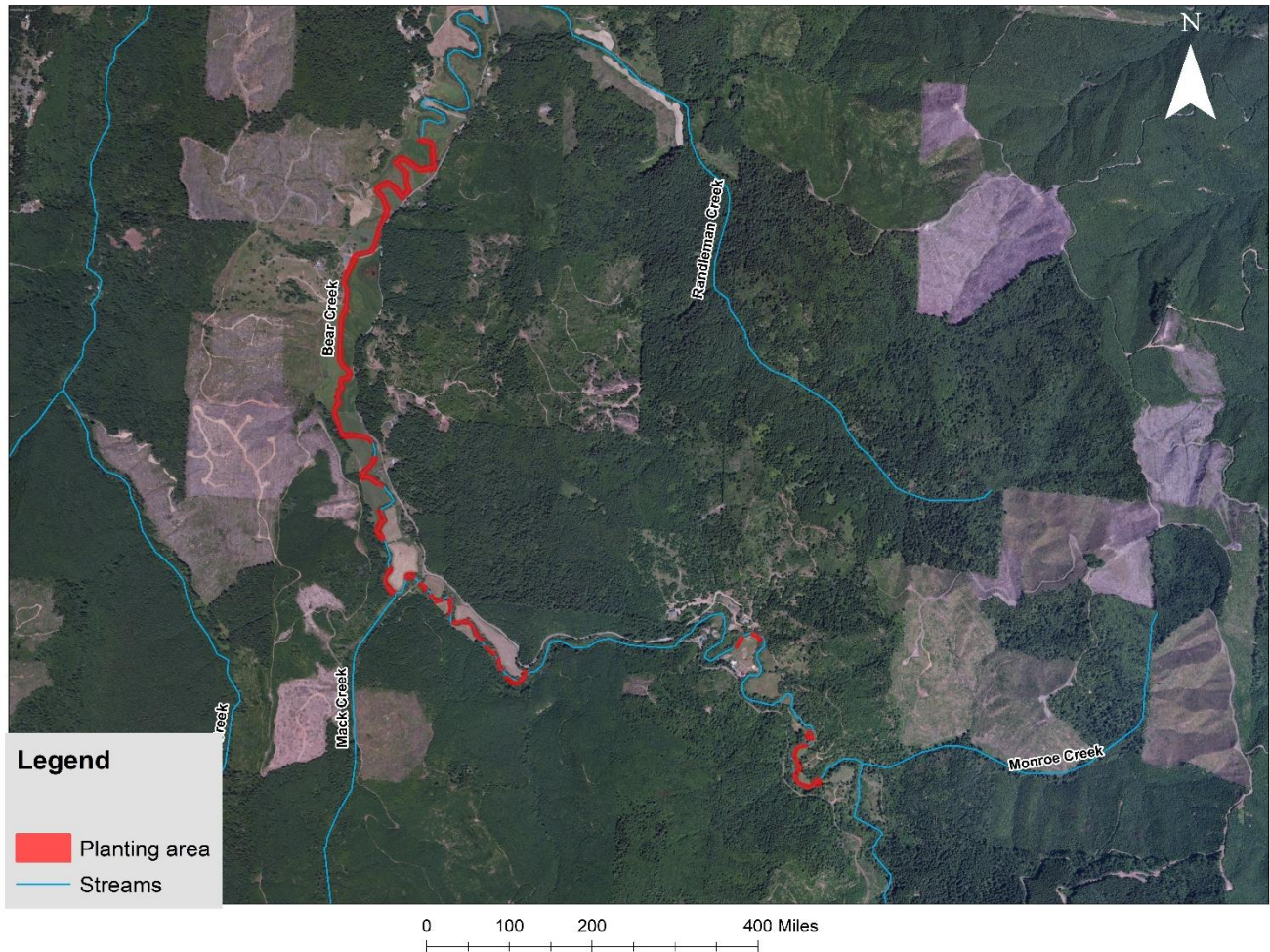


Figure 1. Overview map of proposed riparian planting area for the Bear Creek SIA Riparian Restoration Project

Site Description

Bear Creek sub-basin in the Lower Coquille River Watershed is an important agricultural area and provides essential rearing habitat for juvenile salmonids, including ESA listed Oregon Coast coho salmon. The primary agricultural land use in the Bear Creek sub-basin is grazed pasture and hay production for livestock (mostly cattle and horses with some goats, sheep, and chickens). Timber production is the second largest land use in the sub-watershed. Bear Creek has experienced a significant decline of

mature riparian vegetation from past and current land use practices. This has resulted in a reduction of ecosystem services, like bacteria filtration, shaded stream channels, and stream bank stability.

Soil Types

The two soil types in the Bear Creek Riparian Planting project area are Nehalem silt loam and Kirkendall silt loam, with the majority of the project area being Nehalem silt loam. Both Nehalem and Kirkendall silt loams are well-drained soils that occur on floodplain landforms. The depth to water table ranges from 36-72 inches for Nehalem silt loam and 42-48 inches for Kirkendall silt loam. Soil acidity of both soils is 5.0-5.5 from 0-60 inches in depth. Flooding on Nehalem silt loam is frequent and flooding on Kirkendall silt loam is occasional. Neither soil type experiences ponding. The available water capacity for both soil types is high. The potential for seedling mortality due to soil properties is low in both soil types.

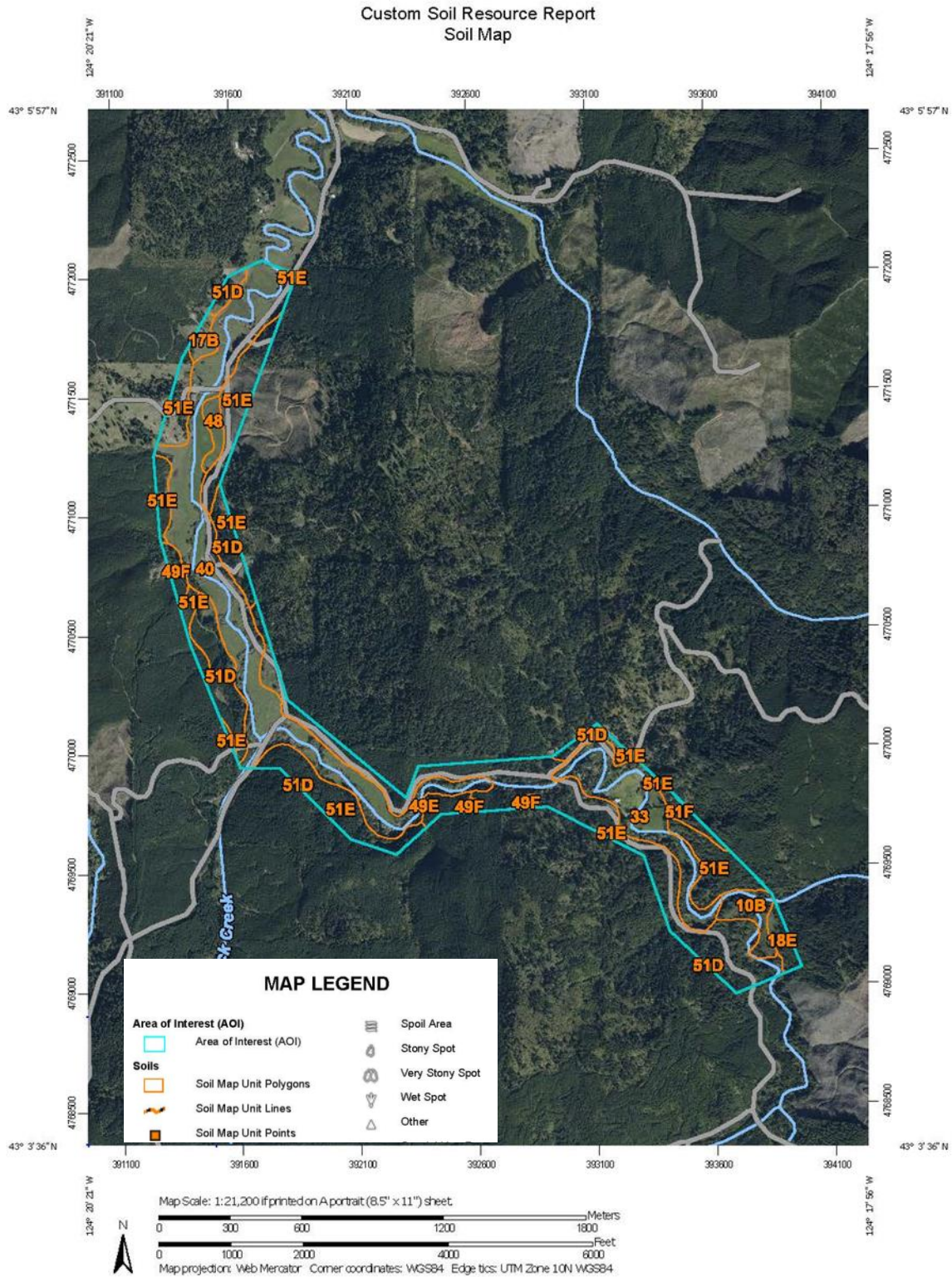


Figure 2. Project Area Soils Map from Web Soil Survey

Table 1. Project Area Soils Table from Web Soil Survey

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10B	Chismore silt loam, 3 to 7 percent slopes	9.1	2.6%
17B	Eilertsen silt loam, 0 to 7 percent slopes	3.5	1.0%
18E	Etelka silt loam, 30 to 50 percent slopes	4.8	1.4%
33	Kirkendall silt loam	35.1	10.0%
40	Nehalem silt loam	105.6	30.2%
48	Quosatana silt loam	4.4	1.3%
49E	Remote loam, 30 to 50 percent slopes	4.2	1.2%
49F	Remote loam, 50 to 75 percent slopes	5.7	1.6%
51D	Rinearson silt loam, 0 to 30 percent slopes	32.6	9.3%
51E	Rinearson silt loam, 30 to 50 percent slopes	140.5	40.2%
51F	Rinearson silt loam, 50 to 70 percent slopes	4.1	1.2%
Totals for Area of Interest		349.5	100.0%

Site Preparation

Weed Removal

To prepare the project area for planting, competing species of invasive/non-native vegetation such as Himalayan blackberry and reed canary grass will be removed by using a weed-whacker or brush hog. Weed removal will take place during late fall of 2023.

Immediately before planting each seedling, manual scalping with a weed whacker (with brush blade) will take place in a two-foot radius around the planting point. This will allow seedlings to grow freely without immediate competition for moisture during the summer.

Nursery Stock Purchase

Plants that cannot be easily transplanted from wild-growing specimens will be bought from nurseries. Local nurseries that grow native plants will be prioritized, including Stillwater Natives Nursery and Matson Creek Native Plant Nursery. The purchase of bare-root seedlings will be prioritized because they are widely available, economical, and adapt and grow quickly when planted. However, some plants may only be available as plugs or in containers. Tall seedlings, like 1+1 or 2+1, will be selected to maximize their ability to compete with weeds on the site.

Wild Collection and Storage

Willow, red-osier dogwood, and black cottonwood stakes at least 36" long will be cut from local stands at similar locations with similar soils in the same watershed. Trees of at least two years old will be selected for cutting stakes, so enough energy is stored in the stakes for new plants to establish. Stakes will be taken from many individual plants to ensure that material is collected from both male and female plants of dioecious species and to represent a genetic diversity of plant individuals. Stakes will be selected that appear free of disease or physical damage. Less than half of any single tree will be removed. Tools will be disinfected between collection sites using a 10% bleach solution. Stake cutting will take place between November 2023 and February 2024 while the plants are dormant. After cutting, the lower 1/2 to 2/3 of the stakes will be soaked in water for 7-14 days before planting to ensure they have enough moisture for successful establishment.

Planting

Trees and shrubs will be planted according to the specifications described in the tree/shrub establishment specification sheet (612OR) by Natural Resources Conservation Service, Oregon. Planting will take place between November 2023 and February 2024. An experienced crew will be contracted to implement planting, and the crew will be supervised directly at all times by a Coos SWCD employee.

A total of 5,000 trees and shrubs will be planted over the ten-acre project site in the bank zone and overbank zone along Bear Creek. The bank zone is the area of elevation between the average water elevation (base streamflow) and bank-full discharge elevation (bank-full streamflow). Plants suitable for this zone are flexible-stemmed willow, small shrubs, and early-colonizing herbaceous species. The overbank zone lies between the bank-full discharge elevation, which floods every two to five years on average, and the overbank elevation, which floods every 50 years on average. Flood-tolerant plants are suitable for this zone, including flexible-stemmed willows, dogwood, cottonwood, and alder.

Trees and shrubs will be planted at a density that is high enough to outcompete invasive plants and stabilize the stream banks but not dense enough that growth of the native plants is hindered by competition with one another. Willows will be planted 5 feet apart, to mimic dense, natural stands. Larger trees will require a wider planting distance of 10 feet apart, and shrubs will be planted 8 feet apart.

Cool, wet days will be selected for planting to reduce the risk of seedling roots drying out. The nurseries will transport the seedlings and ensure that they stay cold and protected during the commute. Seedling roots will be kept moist at all times. While planting, the seedlings will be carried in a suitable container like a bucket or planting bag. The number of seedlings carried by each planter will not exceed the amount that can be planted in an hour.

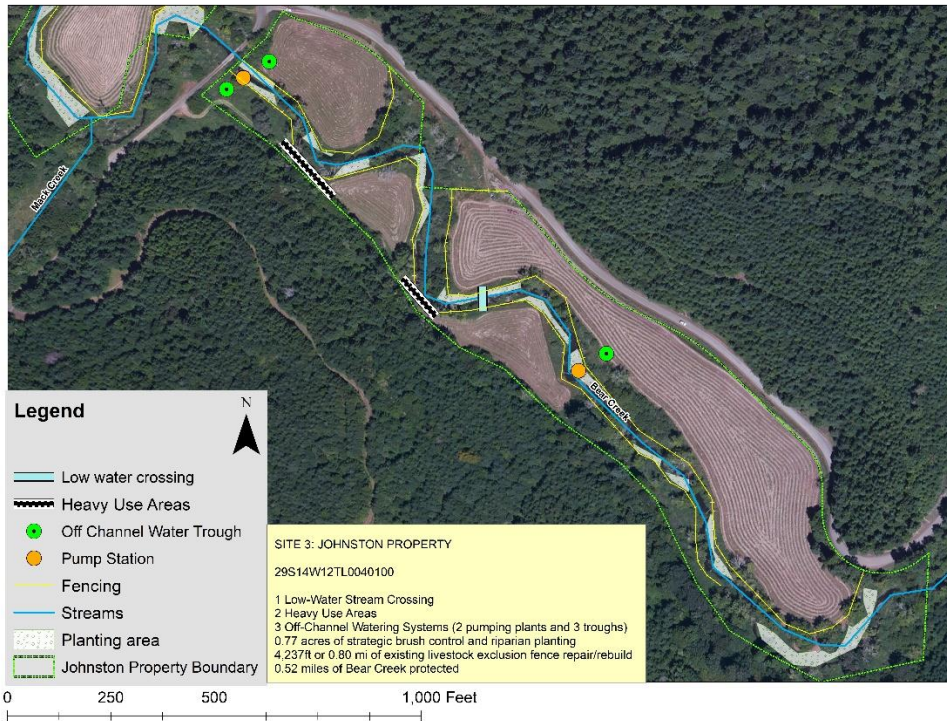


Figure 3. Restoration site 1 on Bear Creek

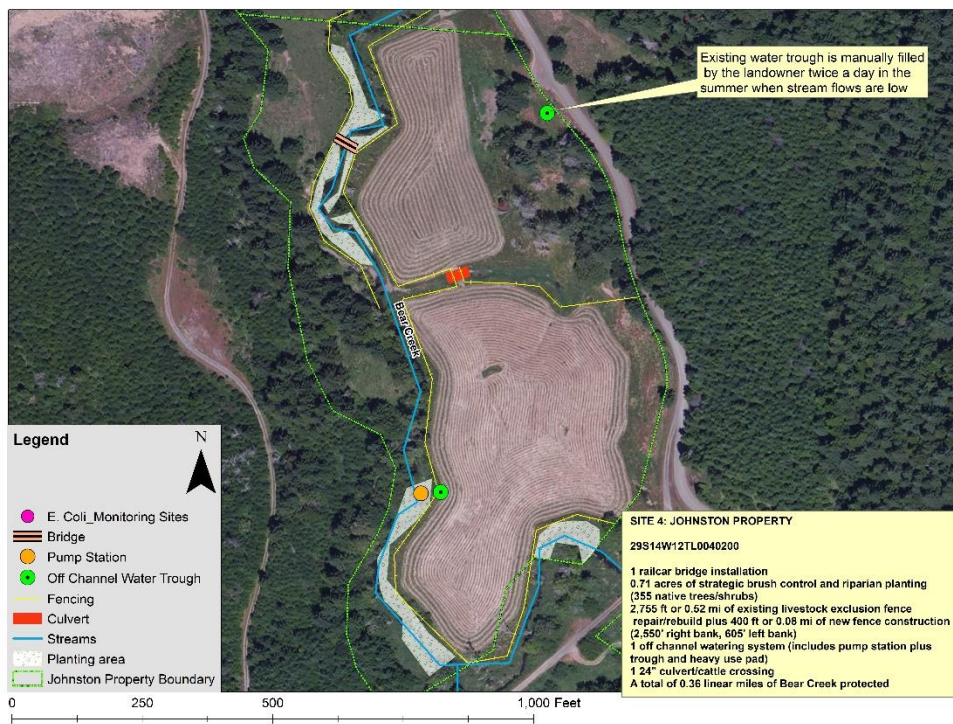


Figure 4. Restoration site 2 on Bear Creek

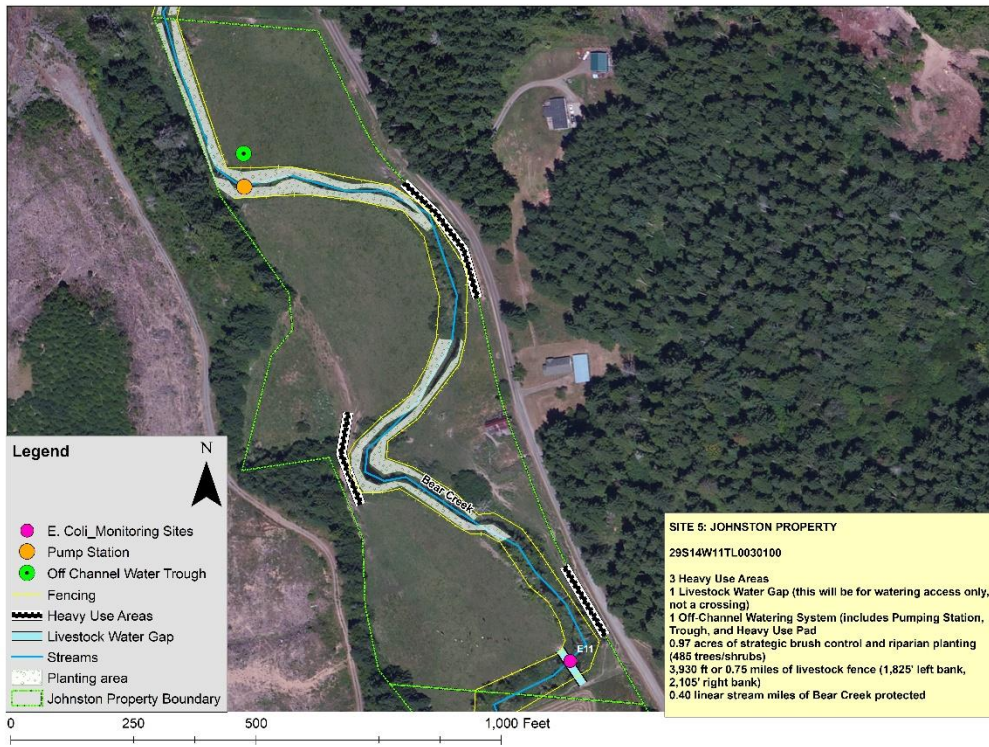


Figure 5. Restoration site 3 on Bear Creek

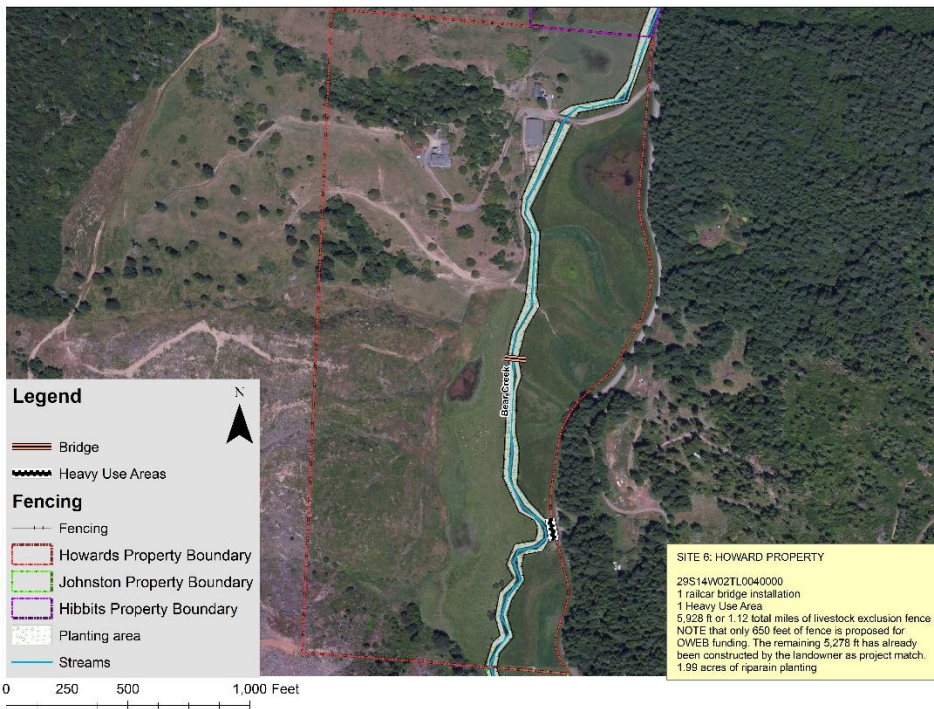


Figure 6. Restoration site 4 on Bear Creek

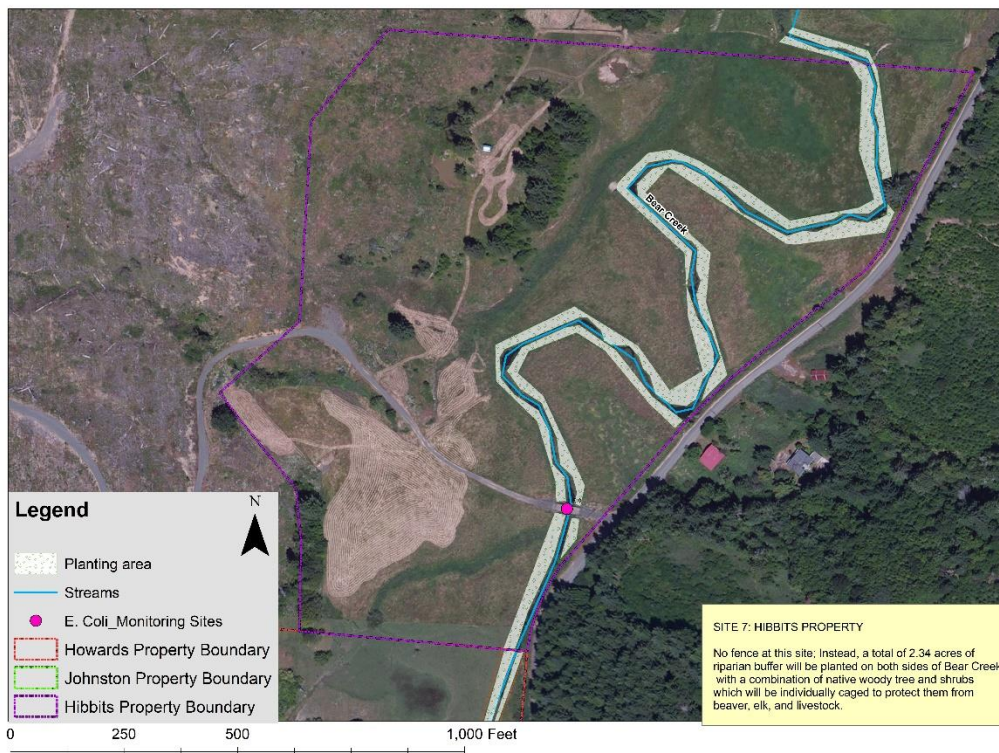


Figure 7. Restoration site 5 on Bear Creek

Tree stakes: This method will be used for planting willow, cottonwood, and dogwood. Holes will be drilled into the soil with a 5” power auger bit to aerate and de-compact the soil and facilitate root growth (This method resulted in a high rate of plant survival on the nearby Offield Creek Riparian Enhancement small grant project (#04-16-003)). Stakes at least 36” long will be placed into the holes so that at least 1/2 to 2/3 of each stake is below the surface with buds facing upwards. Soil will be packed firmly around the planted stakes.

Bare root seedlings: A hole will be dug for each plant that is deeper than the root length to prevent “J” or “L” shaped roots. Each plant will be placed slightly deeper into the hole than the final intended depth, then pulled upwards to ensure that all roots point downwards. The hole will be filled with loose, moist soil, then packed firmly. Care will be taken to ensure that duff and leaf litter do not fall into the hole and that packing is sufficient to fill air spaces around the roots.

Plugs: A hole will be dug the same depth as the container the plug was grown in. The hole will be filled with moist soil, which will be packed firmly.

Containers: Each plant will be removed from its container and planted in a hole at least 50% wider than the container. Planting will be deep enough that the top of the root ball sits at or below the ground level. If any containerized plants are root-bound, the root system will be slit and flared out over loose soil in the hole. Long roots will be cut. The hole will be filled with soil and packed well.

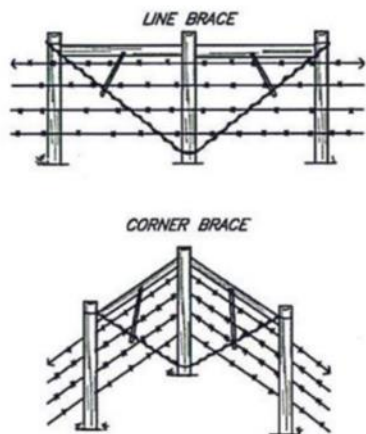


Figure 9. Brace placement for fence construction (NRCS standard 382)

Maintenance

Maintenance of the new riparian plants will take place for a minimum of three years after project implementation until trees are “free to grow”. Scalping using weed whackers will continue as needed until the new native plants are tall enough to compete with weeds for space and sunlight. If a significant number of plants do not establish successfully, our partner agencies and organizations will be consulted for advice and a replanting will be scheduled that incorporates the lessons learned.

Plant Species

A mix of Native plant species will be selected for planting that are easy to establish and well-suited to the soil types, microclimate, and disturbance regime of the project area (see table 1). Other important considerations for chosen species include benefits to wildlife and fish, erosion control capabilities, value to local plant biodiversity, and cultural importance to the Coquille Tribe.

Table 2. Planting plan species list and quantities

Plant Species	Form	Seedling Type	Number	Price per Unit (\$)	Total Price (\$)
Pacific willow (<i>Salix lasiandra</i>)	Tree	Stake	225	0.00	0.00
Sitka willow (<i>Salix sitchensis</i>)	Tree	Stake	225	0.00	0.00
Hooker’s willow (<i>Salix hookeriana</i>)	Tree	Stake	225	0.00	0.00
Northwest Sandbar willow (<i>Salix sessilifolia</i>)	Tree	Stake	225	0.00	0.00
Redosier dogwood (<i>Cornus sericea</i> L.)	Tree	Stake	225	0.00	0.00
Black cottonwood (<i>Populus trichocarpa</i>)	Tree	Stake	225	0.00	0.00
Oregon crabapple (<i>Malus fusca</i>)	Tree	Bareroot	135	4.00	540.00
Oregon ash (<i>Fraxinus latifolia</i>)	Tree	Bareroot	75	4.00	300.00
Bigleaf maple (<i>Acer macrophyllum</i>)	Tree	Bareroot	200	4.00	800.00
Red alder (<i>Alnus rubra</i>)	Tree	Bareroot	135	4.00	540.00

Western redcedar (<i>Thuja plicata</i>)	Tree	Bareroot	200	4.00	800.00
Sitka spruce (<i>Picea sitchensis</i>)	Tree	Bareroot	200	4.00	800.00
Douglas fir (<i>Pseudotsuga menziesii</i>)	Tree	Bareroot	135	4.00	540.00
Western hemlock (<i>Tsuga heterophylla</i>)	Tree	Bareroot	135	4.00	540.00
Nootka rose (<i>Rosa nutkana</i>)	Shrub	Bareroot	135	4.00	540.00
Pacific ninebark (<i>Physocarpus capitatus</i>)	Shrub	Bareroot	135	4.00	540.00
Blue elderberry (<i>Sambucus mexicana</i> ssp. <i>cerulea</i>)	Shrub	Bareroot	70	4.00	280.00
Red elderberry (<i>Sambucus racemosa</i>)	Shrub	Bareroot	70	4.00	280.00
Black Hawthorn (<i>Crataegus douglasii</i>)	Shrub/T ree	Bareroot	70	4.00	280.00
Osoberry (<i>Oemleria cerasiformis</i>)	Shrub	Bareroot	70	4.00	280.00
Cascara buckthorn (<i>Rhamnus purshiana</i>)	Shrub/T ree	Bareroot	70	4.00	280.00
Snowberry (<i>Symphoricarpos albus</i>)	Shrub	Bareroot	135	4.00	540.00
Twinberry honeysuckle (<i>Lonicera involucrata</i>)	Shrub	Bareroot	70	4.00	280.00
Total Number of Plants:			3,390	Total Price:	8160.00

Hardwood Trees

Pacific willow (*Salix lasiandra*) is a popular species for riparian restoration projects because it tolerates constant flooding, reduces stream-bank erosion, and thrives in moist soil and full sun. The Pacific willow grows quickly, but is short lived, so protecting the planting areas with fencing will be important to allow natural regeneration. This plant is culturally important to tribal nations for weaving materials. The Pacific willow should be planted in the overbank zone.

Sitka willow (*Salix sitchensis*) is commonly used in riparian planting projects. It requires moist sites and needs a regular source of water in the summer. The species prefers full sun. Sitka willow reduces riparian erosion, tolerates flooding, and spreads easily. This species supports a variety of pollinator species. The plant is culturally important to tribal nations for weaving materials. Sitka willow can be planted in both the bank and overbank zones.

Hooker's willow (*Salix hookeriana*) grows into a large shrub or small tree, and is found along streams, wetlands, salt marshes, and coastal sand dunes. It prefers moist soil and full sun and tolerates long periods of flooding and poor drainage. This species works well for erosion control. The plant is culturally important to tribal nations for weaving materials. Hooker's willow can be planted in both the bank and overbank zones.

Northwest Sandbar willow (*Salix sessilifolia*) is a large shrub or small tree that grows in wet areas, including riparian zones, silty or sandy areas along streams, and along sandy beaches. It prefers moist soil and full sun. The sandbar willow is an excellent restoration plant because it is easy to establish, and it controls erosion. It is extremely tolerant to flooding. This is a species that the Coquille Tribe wishes to

increase in abundance in the Coquille valley due to its cultural importance. Northwest sandbar willow can be planted in both the bank and overbank zones.

Redosier dogwood (*Cornus sericea* L.) is a common riparian tree that tolerates seasonal flooding and a fluctuating water table. Red osier dogwood thickets are excellent streambank stabilizers. The fruits are important wildlife food. The flowers have ornamental value and are important for pollinators. Redosier dogwood has a variety of traditional uses by tribal nations and is prized for basketry materials. Redosier dogwood can be planted in the upper part of the bank zone and in the overbank zone.

Black cottonwood (*Populus trichocarpa*) grows quickly along stream banks to large size, providing riparian shade and streambank stabilization. It grows well in well drained, moist soil and tolerates flooding but not brackish water. This species should not be planted in areas with saltwater intrusion. The species has low drought tolerance. The extensive root system has a high uptake of nitrates and serves as an excellent filter for adjacent agricultural land. Black cottonwood is an important species for wildlife habitat. Large birds like bald eagles and blue herons' nest in and branches and broken tops and mammals live in rotten trunks. This species is suited for the overbank zone. Black cottonwood is easily damaged by wind and ice, due to its shallow root system. It is also a favorite species for beaver to fell, even large mature trees. Because the species grows up to 60 meters tall, a wind or ice damaged tree falling into a pasture could be a nuisance to a landowner. Black cottonwood must be protected from beaver damage with heavy-duty protectors, and they should be sited where they are unlikely to damage infrastructure like fences if falling at a mature height.

Oregon crabapple (*Malus fusca*) grows well along stream banks in moist soil. Oregon crabapple requires regular summer water to thrive. It is relatively tolerant of shade and slightly tolerant of saltwater. A variety of pollinators benefit from this flowering tree, and it may provide aesthetic value to landowners. The fruits are eaten by birds and mammals. Planting is done from bare root stock, and the difficulty to grow the species is moderate. This species should be planted in the overbank zone.

Oregon ash (*Fraxinus latifolia*) grows well along Oregon streambanks and reaches a height of 75 feet tall, which could provide overstory shade for Bear Creek. Most soil types are suitable for Oregon ash. Although it can grow in wet areas and tolerate flooding, the species is also tolerant of droughts, which are increasing in western Oregon. Full sun and partial shade are optimal light conditions. Oregon ash is an important riparian restoration species because it provides streambank stability and shade. The species can be planted easily from bare root stock or containers with a 14-foot spacing between plants for riparian restoration. Weed control may be necessary for the first two years after planting Oregon ash to prevent it from being shaded out. Although the emerald ash borer, an invasive insect that kills ash trees in the eastern United States, has not been detected in Oregon, relying heavily on ash trees in riparian plantings may result in a vulnerable overstory should the ash borer ever spread to the state. Planting a diverse mix of overstory trees will protect against this possible scenario. Oregon ash can be planted in the overbank zone.

Bigleaf maple (*Acer macrophyllum*) is a common riparian species in Oregon that grows quickly to a large size and grows well in disturbed sites. It is very flood tolerant, requires well-drained soil, and prefers full sun to partial sun. Birds and mammals eat the seeds. Bigleaf maple can be planted from potted plants or seed with stratification. This species should be planted in the overbank zone.

Red alder (*Alnus rubra*) is a common riparian species that grows easily in disturbed sites and quickly reaches a tall size. They reduce soil erosion due to their quick growth and the leaf litter layer that forms below them. Red alder fixes nitrogen, which builds soil fertility and facilitates the growth of other plant species. It can be planted from seed or container plants. Red alder should be planted in the overbank zone.

Conifer Trees

Western redcedar (*Thuja plicata*) grows in moist, acidic, well-drained, loamy soils and tolerates seasonal moisture and shade. It is resistant to pathogens and reaches a large size and age, providing long-term ecosystem benefits to restoration site. This tree is important to many Pacific Northwest indigenous cultures because the bark and wood have many uses. It is also a high-value species for wildlife habitat. The wood of western redcedar is highly valued but the tree is rarely planted in the Douglas-fir dominated tree plantations of western Oregon, so it has become under-represented on the landscape.

Sitka spruce (*Picea sitchensis*) is a common tree species in lower Coquille Watershed that grows in moist, well-drained soils and reaches a large size and age. It requires full sun. This tree hosts pest-eating insects.

Douglas fir (*Pseudotsuga menziesii*) grows best in very well-drained, moist silt loams, silty clay loams, and clay loams. It is drought tolerant and prefers part or full sun. It reaches a very large size and age. Planting can be done with potted or bare root plants.

Western hemlock (*Tsuga heterophylla*) thrives in both full shade and full sun and grows to a large size. It prefers well-drained soils with lots of organic matter. This species is an important component of forested riparian zones in Oregon.

Shrubs

Nootka rose (*Rosa nutkana*) is popular for revegetation projects because it is hardy, grows quickly, and controls soil erosion on streambanks. It is an attractive species to pollinators and the pink flowers are aesthetically appealing to humans. Landowners might appreciate the splash of color in their riparian areas. Nootka rose can grow in full sun or shade and in moist or dry soils. It is best planted in the overbank zone.

Pacific ninebark (*Physocarpus capitatus*) is a common riparian shrub species that is popular for restoration projects because it is easy to plant from cuttings, grows quickly, and controls stream-bank erosion. Moist soils and partial shade are ideal for Pacific ninebark. This species will benefit from supplemental watering during the establishment year. Pacific ninebark should be planted in the overbank zone.

Blue elderberry (*Sambucus mexicana ssp. cerulea* (Raf.) A.E. Murray) grows well along stream banks in moist soil. It is a useful riparian restoration species because it grows tall quickly, has a dense, shading canopy, and the dense roots stabilize stream banks. Blue elderberry prefers full sun to partial shade and is easy to establish. Birds and mammals eat the berries. This species should be planted in the overbank zone.

Red elderberry (*Sambucus racemosa*) is a large shrub that prefers deep, loamy silts and sands that are moist and well-drained. It grows along forest edges and margins and is best planted in the overbank zone. The berries are eaten by birds and mammals.

Black Hawthorn (*Crataegus douglasii*) is a large shrub or small tree that prefers moist, well-drained soils and partial shade to full sun. It can tolerate periodic flooding and is a good species to plant for stream bank stabilization. Black hawthorn berries are eaten by birds and mammals. It is suitable for planting in the overbank zone.

Osoberry (*Oemleria cerasiformis*) is easy to propagate, grows rapidly, and will tolerate a range of shade and soil moisture levels. This species flowers early in the spring, providing an important early food source for pollinators. Mammals and birds eat the fruits. Occasional irrigation in the first one to two years after planting is recommended. In riparian restoration projects, they should be planted 4-6ft apart in transition zones or overbank areas. This is a short-lived species, so long-term presence on the site will depend on natural reproduction.

Cascara buckthorn (*Rhamnus purshiana*) grows in a variety of soil types and tolerates a range of shade conditions. It is effective for erosion control and easy to grow. Pollinators are attracted to this species, and birds eat the fruits.

Snowberry (*Symphoricarpos albus*) grows on slopes and along streambanks and wetlands and appears to do well along floodplain streams in the Lower Coquille Watershed. It prefers partial sun and moist soils and is tolerant of soil type. This is a good browse species for wildlife, and it supports pollinators and caterpillars. Snowberry spreads vigorously and forms dense thickets. This species is suitable for the overbank zone.

Twinberry honeysuckle (*Lonicera involucrata*) is a small to medium sized shrub that prefers moist soils and full sun and grows in riparian habitats. It can be planted in both the bank and overbank zones.

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